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PCT

Docket No.: 043888-0412

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Customer Number: 20277
Tsumoru OHATA, et al. : Confirmation Number: 9671
Application No.: 10/555,657 : Group Art Unit: 1745
Filed: November 04, 2005 : Examiner: Not yet assigned
For: SECONDARY BATTERY

PETITION TO MAKE SPECIAL UNDER 37 C.F.R. § 1.102(d)

Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby petition to make special the above-identified application in accordance with 37 C.F.R. § 1.102(d). Pursuant to MPEP § 708.02(VIII), Applicant complies with each of the following items:

A. FEE

Please charge Deposit Account 500417 the amount of \$130.00 as set forth in 37 C.F.R. § 1.17(h) to cover the fee for the present Petition to Make Special.

B. SINGLE INVENTION

If the Office determines that all the claims presented are not obviously directed to a single invention, Applicants will make an election without traverse and hereby invites

the Examiner to telephone the undersigned Applicants' representative for a telephonic election.

C. PRE-EXAMINATION SEARCH

Applicants submit that a search was made by a foreign patent office in connection with PCT/JP2005/001762 which the present application claims priority under 35 U.S.C. § 371. A copy of the International Search Report (PCT/ISA/210) was filed with an IDS on November 4, 2005.

D. COPY OF THE REFERENCES

Each of the references have been previously cited on an Information Disclosure Statement filed on November 4, 2005. These references are:

U.S. Pat. Pub. No. 2004/0175621;

U.S. Pat. No. 5,948,464;

Japanese Patent Application Laid Open Pub. No. JP 07-220759;

Japanese Patent Application Laid Open Pub. No. JP 2003-115293;

Japanese Patent Application Laid Open Pub. No. JP 10-106530;

Japanese Patent Application Laid Open Pub. No. JP 2000-309672;

Japanese Patent Application Laid Open Pub. No. JP 10-241655;

Japanese Patent Application Laid Open Pub. No. JP 11-102730; and

Japanese Patent Application Laid Open Pub. No. JP 10-050287.

E. DETAILED DISCUSSION

Present Invention

The present invention relates to a secondary battery.

Claim 1 recites:

1. A secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of said positive electrode and said negative electrode; and an electrolyte,

wherein said porous electron-insulating layer comprises a particulate filler and a resin binder, and said particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Secondary batteries according to the present invention require a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes. The electron-insulating layer comprises a particulate filler and a resin binder, wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

It is an object of the present invention to improve the high-rate charge/discharge characteristics and low temperature-environment charge/discharge characteristics.

The indefinite-shape particles according to the present invention each comprise a plurality of primary particles that are joined to one another. Thus, they do not easily become separated into independent primary particles, unlike agglomerated particles comprising a plurality of primary particles that gather by van der Waals forces. The use of such indefinite-shape particles prevents a particulate filler from being filled into a porous electron-insulating layer at high densities. Therefore, it becomes possible to easily form a porous electron-insulating layer with a porosity much higher than the conventional one, thereby enabling a significant improvement in the high-rate

charge/discharge characteristics and low-temperature-environment charge/discharge characteristics of secondary batteries.

The indefinite-shape particles each comprising a plurality of primary particles that are joined to one another have complicated three-dimensional structures. Thus, in forming the porous electron-insulating layer, the interaction of the indefinite-shape particles is considered to prevent the particulate filler from being filled at high densities.

The indefinite-shape particles each comprising a plurality of primary particles that are joined to one another can maintain their shapes with a high probability even if they are subjected to a strong shearing force by a dispersing device in a step of dispersing them in a liquid component to form a slurry. Hence, a porous electron-insulating layer with a high porosity can be formed stably.

Also, the present invention can provide a secondary battery that is excellent in high-rate charge/discharge characteristics, low-temperature-environment charge/discharge characteristics, and safety at low costs. (*See pages 7-8 of the written description*).

Discussion Of Prior Art

U.S. Pat. Pub. No. 2004/0175621; U.S. Pat. No. 5,948,464; and Japanese Patent Application Laid Open Pub. Nos. JP 07-220759; JP 2003-115293; and JP 10-106530 were cited against claims 1-9 by the Examiner in PCT/JP2005/001762 as A references indicating that these documents are not considered to be of particular relevance but that they generally define the state of the art.

Comparison with U.S. Pat. Pub. No. 2004/0175621 and JP 2003-115293

The '621 publication and JP '293 are directed toward a multi-layered negative electrode, wherein the first layer contains carbon as a main component, the second layer is made of a film-like material through which a lithium component passes, and a third layer contains lithium or lithium-containing compound. The '621 publication and JP '293, however, do not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with U.S. Pat. No. 5,948,464 and JP 10-106530

The '464 patent and JP '530 are directed toward a method of forming a porous composite separator layer comprising the steps of printing a thin layer of a separator precursor solution on the surface of an electrochemical electrode. The '464 patent and JP '530, however, do not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with JP 07-220759

The JP '759 abstract is directed to a nonaqueous electrolyte secondary battery comprising a porous protecting film of a specific thickness in a surface of any active material applied layer. The JP '759 abstract, however, does not suggest secondary

batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with JP 2003-309672

The JP '672 abstract is directed to a battery comprising a porous polyvinylidene fluoride based membrane. The JP '672 abstract, however, does not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with JP 10-241655

The JP '655 abstract is directed to a battery comprising a separator consisting of an insulation material particle aggregate layer in which insulation substance particles are coupled with a binder is fixed to active material layers of an electrode. The JP '655 abstract, however, does not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with JP 11-102730

The JP '730 abstract is directed to a lithium secondary battery comprising a membrane-like separator and a particle-like porous layer. The JP '730 abstract, however, does not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

Comparison with JP 10-050287

The JP '287 abstract is directed to a nonaqueous electrolyte battery comprising an inorganic porous separator formed of a polyolefine resin and an alumina fine particle. The JP '287 abstract, however, does not suggest secondary batteries comprising a porous electron-insulating layer adhered to a surface of at least one of the positive and negative electrodes, wherein the electron-insulating layer comprises a particulate filler and a resin binder, and wherein the particulate filler comprises an indefinite-shape particle comprising a plurality of primary particles that are joined to one another.

F. CONCLUSION

In view of the above, it is urged that the petition to make special is in proper form, and an indication of grant is respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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